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II. *An Account of the Nature and Differences of the Juices, more particularly, of our English Vegetables.* By Dr. Martin Lister, *Fell. of Coll. of Phys. and R. S.*

S I R,

THES E were some Papers, which belong'd to a *Treatise of Vegetation*; they were most of them made about *Thirty Years* ago; but as I cannot now attend the finishing of them, so I would not lose them; and therefore recommend them to your Care, such as they are. 'Tis possible I may trouble you with more of them, if these are not slighted; you will easily pardon me, if I have a fondness for Papers of my Youth, more than they deserve,

Your Humble Servant,

M. Lister.

We proceed to set down the Nature and Differences of the Juices of Plants: And first we observe, That mostly Juices Coagulate, whether they be such as are drawn from the Wounds of a Plant, or such as do spontaneously exudate; and yet even that Exudation seems to be often accidental too, that is, by Cancer, or some other such like chance.

And yet I am uncertain what to think of the small purple Blebs and Veins, to be observed more or less on all the *Hypericum* kind, and on the Threads of the Flower, and the Hairs which cover the Leaves of *Rorella* in like manner. I doubt much, whether this may properly be called an Exudated and Coagulated Juice, or no? Our Observations of those of this Tribe, are what follow.

The small green Leaves, next encompassing the Yellow Flowers of *Androsæmum Hypericoides* Ger. are set with very small round Blebs, full of a purple Juice; as are likewise, but with two or three only, the very points or tops of the yellow Leaves themselves: Yet the Stalk cut, doth not to the Eye, discover any such distinct Vessels, carrying that purple Liquor; which makes me suspect, it is separated by Coagulation from the rest of the Juice, and reserved in those small Bags.

Hypericum Ger. The purple Juice yielding Blebs, in this Plant are upon the edgings, on the out-side of all the Leaves. Also the Stalk, tho' round, hath a double edge, on each side one; and the Blebs or Bags, tho' but thinly, are yet observable on these very rising edges too of the Stalks. As for the yellow Flowers themselves, the outmost green Leaves next, and immediately encompassing them, have but a few purple Stripes; but the yellow Leaves or Flowers are edged with small purple Bags on the one side, and striped with Purple-juice-yielding-veins, on the other. Lastly, on the very tops of each Thread in the Flower, is one single purple Bag.

Hypericum Ascyron dictum caule quadrangulo, J. B. In like manner, all the edges, on the out-side of all the Leaves, from one end of the Stalk to the other, of this Plant, are very thick, set with purple Bags. Also in the Flower, all the Threads have one single Bag on the top; but the Flowers or yellow Leaves, and the green ones encompassing them, have very few purple Spots or Streaks visible.

Hypericum Pulchrum Tragi, J. B. only the yellow Flower-leaves, and those green ones which next encompass them, are thick edged with purple Blebs.

If this purple Juice be Coagulate, it is referrable to the next sort of Juices, *viz.* those which cake altogether. *Qu.* Whether it be Clammy too?

Divers parts of the same Plant have divers Faculties, *V. C. P. A. in App.* 330, & 42. I add, That divers parts of the same Plant yield, from the same Veins, different Coloured Juices, *v. g.* the Milk in the Root of *Spondilium Ger.* is of a Brimstone Colour, but in the Stalk White: Yet I make a Question, if the Juice of the Leaves of *Betonica*, in Spring, will not Work by Vomit and Seat as well as the Roots, which ought to be tryed.

Amongst those Juices which Coagulate and are Clammy, some there are which readily break with a Whey. *Juices spontaneously breaking with a Whey.*

In the middle of *July*, I drew and gathered of the Milk of *Lactuca syl. costa spinosa, C. B.* and of all our *English* Plants, that I have yet met with, this most *Lactuca syl.* freely and plentifully affords it. It springs out of the Wound thick as Cream and Ropes, and is White, and yet the Milk which came out of the Wounds, made towards the top of the Plant, was plainly streaked or mixt with a purple Juice, as though one had dashed or sprinkled Cream with a few drops of Claret. And indeed, the Skin of the Plant thereabouts was purplish also, perhaps with Veins. Again, in the Shell I drew it, it turned still yellower and thicker, and by and by curdled, that is, the white and thick caseous part did separate from a thin purple Whey. So the Blood also of Animals, whilst warm remains liquid and alike. but so soon as cold, it cakes and has a *Serum* or Whey separated from it; the Cake is made of glutinous Fibers, and therefore if the hot or new drawn Blood be well stirred or beaten, it will not break. *Qu.* If the same stirring the Milk for *ex.* of *Lac. syl.* in drawing it into the Shell,

Purple
Whey.

Shell, will hinder its coagulating or parting with a Serum or Whey; also, the caseous part of the Milk of Animals is glutinous and stringy. Further, this *Serum* came freely from the other, by squeezing betwixt my Fingers: and the Curds I washed in Spring water, which became immediately like Rags and tough (Draw this Milk immediately, or let it fall off the Plant, into a Shell of fair Water, or other Menstruum, as Vinegar, S. V. Spirit of Vitriol or Sulphur, &c.) and remained still white and dry. As for the purple Whey, after a Days insolation, it stified and became hard, and was easily formed into Cakes; which Cakes were yet very brittle, and would easily crumble into Powder. About *December* following, I broke one of the Cakes, made of the caseous part of the Milk of this Plant; it then proved very brittle, and shined upon breaking like Rosin; it was then of a dark brown Colour; moreover, it burned with a lasting Flame, like Rosin or Wax; and that being melted by Heat, it would draw out into long tough strings, like Bird-lime. On the contrary, the purplish Powder, which was the Whey, if put into the Flame of a Candle, would scarce burn with a Flame at all, but soon be turned into a Coal. Lastly, the purple Powder did taste very bitter; whereas the caseous part was as insipid as Wax.

Qu. Whether the Artifice of Bees doth not much consist in a way Nature has taught them, to coagulate the Juice of Plants, or rather to separate and make choice of the caseous part of the Juices of Plants, already coagulated for their Wax, and the Whey for Honey.

Trachelium.

The Milk also, which the *Trachelium* kind plentifully yields, (I made tryal of four Species of them, viz *Campanula rotundifolia* Ger. *Trachelium majus* ejusdem.

dem. *Trachelium minus ejusdem. Trachelium majus Bel-* Brown
garum Park.) is very thick, and presently curdles ; the Whey.
 serous part or Whey being of a brown Colour. These
 Juices smell sower, something like the slices of green
 Apples, which have been long cut.

The thin Milk of *Tithymalus belioscopius Ger.* springs Tithyma-
 freely and plentifully, it springs the fastest of any Plant lus.
 I know with us ; it is very clammy upon the Fingers ;
 it is very white in drawing ; it turns upon a Lancet, of
 a dark Blewish ; and indeed, it is both of the Colour
 and Consistence of blew Skimmed Milk : Made up with
 Wheat Flower into Cakes, it shews it self greasie or
 oily, and scarce ever dries. It very hardly breaks or
 coagulates. I kept some of it pure and unmixt, in lit-
 tle Essence Bottles, stopped lightly with Cork only ; in
 these it broke in Process of time, and the Curds were
 easily to be formed into Cakes, which Cakes burned
 with a lasting flame, and being melted drew forth into
 Strings like Wax ; the Whey was clear and like fair Clear Whey.
 Water. This broken Milk in all my Bottles was very cor-
 rupt and stinking. Q. What things are there, which may
 hasten the breaking of Juices ? Whether to suffer them
 to sower in a Vessel of Wood for Example, and
 then putting fresh Taped Juice therein, will cause
 any sudden separation ? What respective coagu-
 lum one sort of Juice may be to another, by be-
 ing mixt with various Circumstances ? Whether
 Rennet of Calfe or Hare, &c. or the Flowers of
 Carlina, &c. will have any certain effect here, as
 upon the Milk of Animals ? Another instance of Cor-
 ruption separating the Juices of Vegetables, I find
 in *Cat. Plant. Angl. pagin. 331.* by burying un-
 der Ground for a Year, a covered Earthen Pitch-
 er, well filled with the Leaves of Elder ; you'll
 find

find (it is there said) a Crust at top, and Oyl in the bottom of the Pot. Lastly, The Cakes I made up of this Juice, with Wheat-flower, and a little Gum Arabick, dryed well and kept sweet.

Other clammy Juices there are, which do not let go a Whey when they Coagulate, but cake altogether.

And for this purpose we are to examine the Natures of the Juices of the Hieracium kind, Thistles and Burdock, *Clematis daphnoides minor*, J. B. Onions and Garlick, *Ficus*, *Aceris turiones*.

Juices Ca-
king and
not letting
go their
Whey.
*Hieraci-
um.*
Carduus.
Bardana.
Clematis
daph.
Cape.
Sonchus.
Papaver.

I made Cakes of the sole or unmixt Juice of *Sonchus laevis* & *asper*, without any addition, and it parted not with any Whey.

Papaver rheas Ger. Bleeds freely a white Juice, and the heads or Seed Vessels, when the Flower is gone, do yet Bleed. I observed, that in gathering it into Shells, it presently turned its white Colour into a yellow one, inclining to an Orange. At first Springing it roaped or was but little clammy, and seemed to be very Liquid and Dilute, yet it did not part with any Whey, but grew stiff soon, and is very Resinous and Oily.

Note, The Milks or Juices of Plants, seem to be Compounded and Mixt of Liquors, of different and perhaps contrary Qualities; so that it is probable, if the caseous part shall be Narcotick, for Example, the Whey may not be so; or the one may be hurtful, and the other a good and useful Medicament.

Tragopogon. *Tragopogon flore luteo*, J. B. yields a Juice, which upon the first springing from the Wound, is white and thick, but immediately it turns yellow, and then redder and redder; it is of no unpleasant Taste; it is something

thing glutinous and very Oily, and parts not with much, if any Whey, and therefore it is easily formed into Cakes alone.

Convolvulus major, J. B. bleeds freely a white Juice, *Convolvulus.* as I Experienced in the middle of *August*; not only the Stalk and Leaves, but the white Flowers also in proportion, bleed as plentifully as any part else. This Milk is very sharp, *Qu.* If it be not Purgative?

After our Notes upon white Juices, which Cake without parting with a Whey, we will instance in one of the like Nature, which is of a Saffron Colour, the which *Chelidonium majus* Ger. wounded, freely affords; *Chelidonium majus* Ger. this Juice breaks not with a Whey, but is easily formed into Cakes, and stiffens in the Sun; it is thick, and of the Consistence of Cream, upon the springing forth of it, of the Wound.

There is another very Clammy Juice, which is of a golden or yellow Colour, upon Drawing; and this is the Seed Vessels of *Centaureum luteum perfoliatum* C.B. in *July*, and after, even when the Seed therein contained are turned black and ripe, yield plentifully and freely enough. (These Juices, which the heads or Seed Vessels of Plants afford, may be thought of the same nature, with those Juices which the pulp of *Saffron-coloured Juice.* Fruits afford; the pulp of Fruits, and these exterior Vessels being parts equivalent, that is, Apples for *Centaureum luteum perfoliatum*, C. B. Example are nothing else but the Seed Vessels of their Kernels.) It is Liquid upon first Drawing, and after a while it thickens, parting with no Whey; *Yellow Juice.* (*N. B.* I call this Coagulating too) and this is of the Colour of Amber: It sticks to ones Fingers, and pulls forth into threads like Bird-lime; it would never become harder then very soft Wax, and that by being dried in the Shade only; for if never so little exposed to the heat of the Sun and Fire, it streight-way became *Soft Cakes.* exceeding

exceeding soft. But as for the Cakes I made up of it and Wheat Flower, them I found in my Cabinet in Winter, very hard and firm, and the unmixt Cakes still soft. These burn with no unpleasant smell; they emit a lasting Flame; they still keep their Amber-colour; and draw out in Threads in Burning like Wax.

To this last Coagulate and Clammy Juice, and which will not much harden, we may add the yellow Juice, which the Wounds of *Angelica sativa* Park. yield; it will not harden by insolation or long keeping (for I have had an Essence bottle of it by me this two Years) yet I perceive it stiffens and will draw into Threads.

Examine the Nature of the Juice of Fennel and other ferulaceous Plants, *Qu.* Whether their Juices do not coagulate after the same manner.

Gums.

*Liquid and
perhaps in-
flamable.
Hard Gum,
not taking
Flame.*

The next sort of coagulate and clammy Juices, we have taken notice of are Gums; and some of them seem long to abide Liquid. Whether these are Inflamable or no, I leave for future tryal, having not yet made the Experiment my self: others there are which grow hard, and are certainly not to be kindled into a Flame.

They are easily to be dissolved in Fountain Water, (the Gum of Rhubarb and the Leaves, for Example) and do sparkle when put into a Flame; which two Natures argue a serous or waterish part in them: Again, put into a Flame, they melt and become as it were Liquid and Ductible; which shews the caseous part in them; and because they will not flame, it is an Argument of their leanness and scarcity of Oyl. All three put together plainly evince, Gums to be coagulate Juices.

Qu.

Qu. Whether this Gum comes from the Fruit, or from the Leaves and Stalk ? And if from the latter, whether any part of the Tree (as Body, Root, or Branch) will spend it, being purposely Wounded, and in what Season, &c.

The Instances I have to set down of either, are as follow :

In *August* I have observed the Clusters both Green and Ripe of *Periclymenum Ger.* very Leaky; which upon nearer and heedful Inspection, I found to be a thin clammy Juice, or Liquid Gum, which falls down upon the Leaves, and keeps its Liquid Form there. *Periclymenum.*
Liquid Gums.

Here the Purple Juice seems to be a Whey separated from the liquid Gum ; but I am of Opinion it's a distinct Liquor.

Again, the red Threads of *Rorella* end, or are topped with little Bags ; which being compressed do yield a Purple Juice (as we above Noted in the *Hypericum*) and those small Buttons on the very tops of those Threads, are encompassed with small Transparent Pearls or Drops of a liquid Gum. They abide in this Form the hottest Summers Day like Dew, whence also the Plant has its Name ; and upon the least touch cleave to your Fingers, and draw out into long Threads like Bird-lime. *Rorella.*

In like manner a liquid Gum (but that it stands not upon so long Threads, and is much thicker bedewed) you may observe upon *Pinguicula*. *Pinguicula.*

Note well, That the small Drops and Threads, or Hairs, in either of these two Plants, are to be seen upon the uppermost or inmost side of the Leaf, and the outmost and undermost is smooth or void of them, which is something contrary to all other Plants I have observed.

Alnus
Quercus.

My-thoughts I observed about Mid-*August*, the Chats of the Alder to be Gummy.

Qu. Whether it did not exudate from the Plant it self; as I guess the Honey fall, or Gummy Dew, to be observed upon the Leaves of the Oake, &c. are nothing else? *V. C. P. Angl.* concerning Manna gathered off the Ash.

The next Instances are of Gums, which grow hard in time, readily dissolve in Water, and are not to be kindled into a Flame, though they become thereby soft and ductible.

White and
clear, and
hard Gum.
Rhabarba-
ra.

The *American* or *Indian* Rhubarb Sown in our Gardens, is the only Plant that I have met with, or ever saw, which yielded a Gum; and yet, because it is of the very kind with our common Sorrels and Lapathums, I believe it not impossible, yet even from our own store, Herb-Gums might some ways or other be had. I say, that of the Stalk, or indeed of the Leaves of the *Indian* Rhubarb, I have gathered an Ounce at a time in *June*, of very white and clear, and hard Gum, both in those Years I observed to flower with us, as 1670. and in that Year it did not, 1669. It exudates from all parts of the Stalk and Ribs, on (Note well) the under-side of the Leaf it self. I gathered some in the form of good big Drops; others, as though the Stalk had been besmeared with it; others, shot into long and twisted Wires or Icicles. Moreover I observed, that the cankered Orifices, or places where the Gum had burst forth, might be followed into the Stalk with a Knife, and that through the Skin: In certain places I could see that the Juice within the Plant was turned Gummy, and looked clear like Ice.

It is the Experiment of *Mr. Fisher*, that the clear and defecated Juices of most Plants, have more or less redness in them. *V. C. P. A. Pagin.* 325. *App.* Again,
in

in the same Catalogue, *Page 334. App.* That the dried Root of *Acetosa* (a Plant of the Family with Rhubarb, which may well be called *The Indian Sorrel*, or *Sower Docken*) Boiled, doth Dye Water with a fair Red Colour. And I have observed, that the unripe Seeds of Rhubarb, yield a very fair and deep Purple, I mean the Husk of them. Consider what hath been above-said of *Rorella*, and the *Hypericum* Kind, concerning their Purple Juice yielding Blebs. Note also here, to this purpose what we have set down above, that Rhubarb and Sorrel, &c. do, when they decay, turn Red.

The Juice Extracted from the Roots of our *English* Rhubarb, by a Tincture of fair Water steamed away, is nothing else but a lean uninflamable Gum; and though it differ in Colour (perhaps from the yet woody parts in it, as being of a deep Liver Colour) from the exudating Gum; yet in other Natures, as this of being uninflamable, ductible in the Flame of a Candle, &c. it agrees with it. *Qu.* Whether the Extracted Juice of the *Indian* Rhubarb be more Inflamable than ours?

I may not omit, that the repeated Cuts I gave the Stalk, on purpose to have of the Gum that way, failed my Expectation. This Gum is sweet, or rather of no taste at all.

To this purpose I remember in Summer time, to have seen even the Juice of Apples spontaneously jellied in Languedoc, and the Apple to look clear and hard like Ice, whence they call that sort of Apple *Pome Gelée*, or the *Frozen Apple*. Though indeed, it be nothing else but the breaking or coagulating of the Juice in some spots of it, for it is rare to see one of them all over so. *Qu.* Whether the tart Juice of Rhubarb will Jelly when Boiled?

We may here give a probable reason, why a gentle Infusion or Maceration of Rhubarb, is a very sure Purge, but the Substance or Powder of Rhubarb, or a Decoction thereof, will have a quite contrary effect and bind. We may, I say, think, that the sharp and tart Juice in Rhubarb, wherein its Purging Faculty lies, is by a gentle Infusion so Extracted, that it turns not to Gum in our Stomach. For I cannot think, that the slower Juice of Rhubarb, is a specically distinct Liquor from the Gum, which I believe to be only an accidental Coagulation.

Qu. Whether the drying of Plants do not alter their Juices? Whether a long and competent keeping of our *English* Rhubarb, will not quicken and encrease its Purging Virtue? Whether the Juice of dried Plants, spend their Juices upon Maceration or Decoction lesser, or more freely then green ones? What difference betwixt a Decoction or Maceration of green and dried Plants?

Pernia. Green Plumbs or Sloes do often break forth with a Gum, which is clear and transparent, and it seems to hasten if not ripen, at least the red Colour. I have cur them, to the end that I might have gathered Gum in the Wounds, which, indeed I did; but yet long after, when the Wounds seemed to be Cankered, and that but in a small quantity to what they voluntarily spend.

Lauro-cerasus. *Lauro-cerasus*, a beautiful Winter Green, which we have adopted to adorn our Court-Walls with, yields a clear Gum very plentifully: It is very white and very clear.

Qu. At what time of the Year, in this or any other Plant, the Gum may be drawn, whether in Spring only, or in Autumn also?

There

There are other sorts of Juices, which will not of themselves, that I have observed, exudate out of the Wounds of their respective Plants ; and of this sort of Plants is the Holly.

I wretched and Wounded the Holly the latter end of *March* ; and yet after some Days of warm and open Weather, I could not perceive the least stirring of Juice. The latter end of *May*, the Bark begins to be full of Lime, which you may try, by pressing a piece of it between your Fingers, and when you would take them off, the Juice or Lime draws out into Heirs, and follows your Fingers, cleaving to them like small Threads.

This Lime or Juice is separated or taken out of the Bark thus ; Peel off the Bark the Months of *May*, *June*, or *July*, for it then comes easily away, and most abundantly with Juice : Boil the Bark in fair Water, until it be so tender, that the outmost thin Grey Bark or Membrane peel easily off ; lay it so peeled, and cover it over with green Nettles or Fern, or such like, *S.S.S.* in a Cellar for about ten Days, where it will ferment or rot, and become Mouldy. Take them out, and beat them well in a Mortar to a Paste, and roul them up into small Hand-balls, and in a running Spring wash them clean, from all the woody or sticky parts ; which is effected by pulling and teasing them. But Note well, That great care is to be taken in the washing of the Balls ; for besides that they must, if possible, be forthwith washed, the Lime will all get from you, except you so order the matter, by engaging with your Fingers that it entangle. You would imagine, that upon breaking one of the Balls, that there was little or no Lime in them, so freely they moulder and crumble. After it is once engaged throughly, it will endure washing ; and the clearer you take away the woody parts, the better it is.

Qu. Whether the like Rotting other Barks, will in like manner separate their Juices? Also, Whether it be not to be Experienced in the rotting of Herbs? Whether the body of Holly have any Lime in it, as the Bark?

Sambucus. In cutting the tender tops of Elder, the latter end of May, there will a stringy Juice follow your Knife, and draw out in Threads, somewhat like Bird-lime or the Juice of Holly: it seems to be in certain Veins just within the Circle of Teeth or Wood.

Bryonia
Narcissus,
Filix. Hy-
acinthus
Viscus Vi-
burnum. We are to Examine for this stringy Juice, the Roots of the *Hyacinthus* kind, also *Viscus, Viburnum, Asphodelus Lancastriæ* Ger. *Narcissus syl. Pallidus calice luteo* C. B. *Bryonia tum alba tum nigra. Filix femina, &c.*

Oily Juices. Further, the Dissected Veins of many Plants, afford us Oyl, that is, such a Juice, which being rubbed betwixt ones Fingers, is not at all Clammy, but makes them greasie and glib. Some of it stiffens not, as far as I have yet Experienced, yet I believe it to be coagulate and mixt. We will instance in the Juice of

Helenium. *Helenium sive Enula campana* J. B. You may take it off with a clean Knife, whereon it looks like Oyl mixt with Water, that is, the thin or dilute Juice of the Plant, springing up out of the Wound, together with the Oyl. The like Experiment may be made upon *Cicuta*.

Qu. Whether these Juices will not in process of time grow stringy? I having once ranged the Juice of *Angelica sativa* Park. amongst those, and yet I found it altered after a Years keeping, and grown very Limy.

Tapsus barbatus. *Tapsus barbatus* Ger. If you strip off the Leaves in June, it seems to yield an Oily Juice, but very much thinned with the Watery one. It springs freely enough; it

it is of a dark green Colour, and I took it in Wheat-flower, and made it up in Cakes.

Also the Fruits of many Plants afford Oiles, as *Olivæ*, *baccæ lauri*, *hederæ*, *Juniperi cornus fæminæ*, &c. *V. C. P. A.*

The Pulp of most Seeds seem to abound with this *Plantarum* Oily Juice and at some time before their Maturity, it *femina* is liquid and visible in them, in the form of a Milk. I instance in

Helleborus niger syl. adulterinus, etiam hyeme virens, *Helleborus*. *J. B.* The Seeds of this Plant, the latter end of May is very Milky, and by Insolation is easily formed into Cakes, which are yet very Oily, and being long kept, I have exposed to the flame of a Candle, which they receive, and burnt freely, sparkling not very much, and not then neither being clammy at all. One thing I must not omit, that this Milk or Juice of the Seeds, is of a very fiery and stinging Nature; for when I cut the Seeds out of the green Pods, they struck my Eyes no otherwise than Onion is wont to do. Moreover, the tops of my Fingers, which were wetted with this Juice, did boaken and ache, as when after extream cold, one has the *bot-ach* in them; and that pain continued in them for several Days; and at length the Skin of my Fingers end peeled off.

Diacodium album, is a Medicament of the Seeds of Poppy; to this purpose Examine *Dulcamara* the latter end of May, and *Thalictrum majus* Ger. the beginning of June.

There are doubts made concerning the way of making the best and Genuine Elaterium of the Antients: *Theophrastus* and *Dioscorides* seeming to differ about the marks of it. *Qu.* How the Seed alone of *Cucumer* *Asininus*, taken in the Milky Season will prove for good. *Cucumer asininus. Elaterium.*

There

There are yet other Oily Juices, which after Coagulation harden, and are called Rosin; and such our Ivy yields abundantly. Hither also may be referred the Juice of *Juniperus vulgaris baccis parvis purpureis*, *J. B.* which is a hard fat Juice and not much Gummy.

*Rosin or
hard Oily
Juice.
Hedera.*

In the Chops of Ivy made in *March*, there did exude a thick Matter like Barm, yellowish and greasie: It melted like Oyl betwixt my Fingers, not having the least clamminess then perceivable. In process of time it hardned and crufted on the Wounds like course brown Sugar, it burns with a lasting Flame, and smells very strong.

Lactuca syl.

Also on the top-most Leaves of *Lactuca syl. costa spinosa*, *C. B.* in *July*, many small Drops or Pearls of an Oily Juice, coagulated and hardned Rosin-like, are plain to be discerned, especially with a single Microscope: They are of an Amber Colour and Transparent, easily to be wiped off, as being only Oily Juice exudated: And I am of the Mind, that even the blew Flower of ripe Plumbs is nothing else, but a fine resinous coagulation of the transudated Juice.

Flos prunorum.

*Lapthum
unctuosum.*

On the underfide of the Leaves, and all over the Stalk of *Bonus Henricus*, *J. B.* do stick infinite small Transparent Pearls: Those clear Drops are hard to the touch, and feel like greasie Sand, not clammy, and therefore it was well called *Unctuose* by *C. B.* and we put this spontaneously exudated Juice, amongst the resinous Coagulations; Infuse often in the same Liquor this Plant. *Qu.* Whether the Sand be Inflamable? At what time of the Year it most abounds? *Qu.* concerning the hoariness of *Vulvaria*?

And thus far we have treated of the Juices of Plants, as they are differenced, principally by that accident of Coagulation and other Natures: Now we proceed to Note our Observations concerning the same Juices

of

of Plants, as they are varied and distinguished, by that other accident of Fermentation.

And not only the Juices of Fruits are to be wrought or set a working, as of the Apple, Pear, (*V. C. P. A.* 270.) Briar, Grape, &c. as is well known ; but there is an artificial change, *viz.* Malting, to be made even in the Seeds of Plants, so as to make them spend freely, or let go their Juices, and communicate them to common Water, and receive a ferment : Also the Juice of the Roots *Glycyrrhiza* will ferment, *V. C. P. A.* Pag. 135. Also the Juice of the Cane, as Sugar. Again, the tap-ed Juices of Vegetables (wherein my Observations are limited) are susceptible of a Ferment. As for Instance;

The 21st of *April*, 1665. about eight in the Morn- *Retula.*
ing, I bored a hole in the body of a fair and large Birch, and put in a Cork with a Quill in the middle ; after a Moment or two it begun to drop, but yet very softly : Some three Hours after I returned, and it had filled a Pint Glass, and then it dropped exceeding fast, *viz.* every Pulse a Drop : This Liquor is not unpleasant to the Taste, and not thick or troubled : yet it looks as though some few drops of Milk were spilt in a Basin of Fountain Water. *Vide Philos. Transact.* There are many ways of Fermenting or setting this Juice a Working, that is, of keeping it from Coagulating. And here I cannot omit, what I have observed concerning the great Change, which the Juice, particularly of this Tree undergoes, by being long buried under Ground. *Pimco* is one of the highest Mountains in *Craven*, lying on the South side of that Country, some two Miles above *Carleton*. On the South side the Pike (as they call the very top of that Mountain) is a place where the Water stands ; this is called a Moss, and is

some Fathoms perhaps, deep in black Mud. Here are dug up, if we will believe the Inhabitants, not only Roots, but whole Trees of Fir. It is true, I saw there no small marks of a Wood in former Ages, as the Roots or Stumps of Trees appearing above Ground; but upon due Examination of the Grain and Bark, I found them to be the Roots of Birch. These Roots split easily and soon dry, and when dried they burn with a lasting Flame, and for this purpose they use them upon any sudden occasion about their Houses: And altho' the Flame be great, yet it is without any Resinous smell. However, it seems, that their having lain so long under Ground, has prepared the Juice for burning. Examine the *Fir-spells*, as they call them, who are brought up the River *Ouse* by the Turff-men, and sold at *York*.

There have been Oaks, as I have been told, dug up hereabouts also, but I saw none.

*After ma-
jor & mi-
nor.*

The Maple, both that which is miscalled the *Sycamore*, and the lesser, bleed a fermentable Juice copiously, in the break up of hard Frosts.

*Salix, Ing-
lans, Popu-
lus, Sorbus.*

Also the Willow, Walnut, Poplar, Whicking, are all said to bleed in their Seasons a Vinous Juice.

To Extract the Juice of Vegetables, as Opium for Example (as is usual in the best Preparations and Methods of making *Laudanum*) with Spirit of Wine, is not probably, to separate any one part of that coagulate Juice from the other, as the Serum or Whey, (for Example) from the caecous part of the Juice, but only to depurate or defecate the Opium: for *S. V.* says Mr. *Boyle*, will dissolve *Gum Lacc. Benzoin*, and the resinous parts of *Jallap*, and even of *Guajacum*, which are Coagulations and mixt Juices;
and

and the same we may think of the Juices that are Extracted by *S. V.* from other Herbs that they are mixt. *Qu.* Concerning Hydromel, Wine, Vinegar, &c. whether they can reasonably be called separating Liquors, as which will only dissolve the Serum of a Juice.

Also, those other ways of Roasting and Drying Juices, upon Plates over a gentle Fire, until they will rub to Powder, gives no great satisfaction to me, that the Narcosis of Opium, for Example, is gone or separated, because the dried Juice less offends the Nose, that is, smells not so strong.

The Whey of *Lact, syl.* will be only dissolved in cold Water, the Curds wholly refusing to mix with it. *Qu.* Whether it will not succeed in other Juices, so as to make good that simple? Water is the best *Menstruum*, and that it really separates, what *S. V.* only depurates.

And thus far we have set down our Observations and Experiments, concerning the Juices of Vegetables, both those which appear Coagulate, and also those which are fermentable, and have likewise noted other their respective Natures and Differences. We are in the next place to learn by particular Experiments, what different parts, each particular Juice doth consist of, and by what ways they may best and most conveniently be separated.

Ways of separating the parts of coagulated Juices, and even after fermentation.